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# THE PROBLEM OF SPACE IN JEWISH MEDIAEVAL PHILOSOPHY

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## CHAPTER II

### ABSOLUTE SPACE.

THE subject that now presents itself for discussion, is *absolute space*, by which I mean not the space of this or that object that is directly given in our intuition, but the one that is the product of a mental process of abstraction and generalization. The former space is concrete and perceptual, denoting an impress of the external world upon our senses; the latter space is absolute and conceptual, denoting a reaction of the mind upon the external world. Empirical space is variegated and discrete, manifesting itself in the space of this desk and that landscape and those heavens; conceptual space is uniform and continuous—one great *continuum* without bounds. The conception is a difficult one, implying the absence of any material data to which the human mind could cling: that is why it was so often a source of error and confusion. Yet if you close your eyes and think away the walls of the room and the furniture in it; and think away the world outside of your room, the sun, the moon, and the stars; and think away also the earth under your feet, and the very body in which your mind happens to reside; and think only of your mind floating in an endless monotonous void—you will have some faint glimpse of the endless

*continuum* in which the material universe is conceived to be submerged, absolute space.

We have seen in the preceding chapter that Jewish mediaeval thinkers never questioned the reality of the extensity of things, never doubted the independent, objective existence of empirical space; yet up till the end of the fourteenth century they all unanimously repudiated the assumption of absolute space. This can be explained in two ways. First of all empiricism was the standpoint taken by the Jewish philosophers in the middle ages. It is proclaimed by Saadya in the introduction to his book called *Beliefs and Opinions*, and it is emphasized by the thinkers that came after him. Maimonides scoffs at the Mutakallimun, those Arabian scholastics, who would assume anything imaginable which would fit in the system; and if contradicted by our senses, they would have a ready reply: human perception is not reliable.<sup>75</sup> Hence this empirical standpoint might have prevented the Jewish thinkers from believing the existence of anything that cannot be empirically known. But there is also another reason that has an equal degree of probability. Aristotle's conception of space was such as to exclude the notion of absolute space. Now Aristotelianism exercised unimaginable sway over the Jewish thinkers. It was the standard of truth. Thus if the Bible took issues with Aristotle, it was incumbent upon them to explain away the apparent meaning of the Bible, and so interpret it as to be in accord with Aristotle. 'Stultum est dicere Aristotelem errasse.' Hence in accepting the Aristotelian notion of space, which, as I say, excluded the reality of absolute space, they had

<sup>75</sup> Comp. *Guide*, I, ch. 73, prop. 10.

to accept also the conclusion that might be logically drawn therefrom. And so the situation lasted until the Aristotelian influence began to wane, and the great challenger of Aristotle, Hasdai Crescas, appeared, and gave to the notion of space a different meaning, and proved the objective reality of absolute space. Let us first discuss the history of the Aristotelian notion of space in Jewish philosophy; we will then come to the objective reality of that vast *continuum* which we cannot experience, but which the mind postulates.

I. Just a word is necessary to call up in the reader's mind this Aristotelian notion which we have already discussed in the introduction at length. We all speak of things being in space; the desk, the house, the aeroplane, the world—all things are in space. Space then carries the notion of an encompassing body, and Aristotle defined it as *the first limit of the containing body*. Now the far-reaching consequences of this definition lie in the fact that it does away with the mysterious independent existence of space. It is simply the relation of contiguity between two objects; where this contiguity is missing, of course you have no space. Thus the uppermost, all-encompassing sphere in the Ptolemaic astronomy, while being the space of all things, is itself in no space; for there is nothing higher to be in contact with it, not even a void.

This Aristotelian notion was, as I said, accepted without reserve. Saadya<sup>76</sup> combats the view of space as that in

<sup>76</sup> *Emunot*, I, 4 : או שמה יחשוב במקום הארץ ויאמר אי זה דבר היה במקום הזה ומאמרו זה אמנם מביא אותו סכלותו בדרך המקום. וסברתו כי ענין המקום הוא מה שהוא מושם תחת הדברים ותבקש נפשו מקום למקום ורואה שאין לזה תכלית ויהיה נבז. וצריך שאבאר כי אמתת המקום איננו כמו שחשב אבל הוא פנישת שני הגשמים המתמששים ויקרא

which all things are submerged, and defines it as 'the contiguity between two objects'. He thus answers the objection levelled at the adherents of the doctrine of *creatio ex nihilo*, namely, what was there in the space of the world before it had been created? Since there was no world, there was no relation of contiguity, and hence no space. He also meets Zeno's argument that if all things are in space, space itself will have to be in space, and so on *ad infinitum*, consequently space does not exist. The strength of this argument is evidently questionable; all it may prove is that space is infinite, but not that it is non-existent. To Saadya, however, such a conclusion would not be in accord with Aristotelianism, and hence wrong. He shows that if

מקום מישושם מקום אבל ישוב כל אחד מהם מקום לחברו. והארץ עתה בסבובה קצתה מקום לקצתה וכאשר לא תהיה ארץ ולא גשמים יבטל שיאמר מקום בשום פנים.

Kaufmann in his *Attributenlehre*, p. 63, note 117, misconstrued the whole passage. He explains the phrase **מה שהוא מושם תחת הרברים**, which he wrongly designates as Saadya's own view—as 'dasjenige was an die Stelle der Dinge sich setzt, d.h. beim Fortrücken eines Dings dafür eintritt.' When an immersed body, a cubic inch in volume, is removed, the liquid will naturally fill the gap, the cubic inch of the liquid being the space of the displaced body. But according to this interpretation, an object and its space cannot be conceived simultaneously; which is absurd. To place an object and to displace it, are two distinct ideas. Perhaps what Kaufmann had in mind is not the cubic inch of the displacing liquid, but the cubic inch as such, the stereometric content, so that the interval between the superficies of an object would be its space, a theory discussed and combated in Aristotle's *Physics*; but this 'interval' is altogether wanting in the words of the definition. What Saadya referred to in that expression is undoubtedly the Platonic notion of an all-containing receptacle, against which Saadya advances Zeno's argument that this receptacle must itself be contained, and so *ad infinitum*. Kaufmann also misunderstood the expression **אבל ישוב** **מקום לחברו**, **כל אחד מהם מקום לחברו**, apparently he read **ישוב**, for he translates it: 'Die Ausdehnung—eigentlich das von jedem von beiden Bewohnte', but the Arabic original, **دَل يَمِير**, clearly indicates the true meaning.

you understand by space a mere relation of contiguity, the whole argument becomes meaningless. But the reader will realize at once that this position, while apparently attacking Zeno, really admits his argument, i. e. that space as an all-encompassing void is inconceivable; there is only a relation of contiguity. There is *place*, but not *space*.

This became the traditional view in Jewish philosophy. Gabirol speaks of space as implying 'the immediacy of the surface of one body to that of another body', or simply 'the contact between two bodies'.<sup>77</sup> Abraham bar Hiyya defines space as 'that which envelopes the shape of a body all around from the outside'<sup>78</sup>—a phraseology which is not quite fortunate, but whose meaning is clear. Joseph Ibn Zaddik maintains that 'the true meaning of space is propinquity, for there is no container without something contained, nor anything contained without a container',<sup>79</sup> and that 'the uppermost sphere needs no space because its parts constitute space for one another',<sup>80</sup> which means that the largest diurnal sphere, inasmuch as it rotates only around its axis, and does not as a whole change its position, does not require any space over and above; only its parts change their relative position, and they constitute space for one another. Abraham Ibn Daud understands by space 'that

<sup>77</sup> See *Fons Vitae*, II, 14, p. 74, 24 'Locus est applicatio superficiei corporis ad superficiem corporis alterius'; comp. also II, 14, p. 49, 5 'Intentio loci noti est applicatio duorum corporum.' Comp. *Mekor Hayyim*, II, 21: אחר גוף בשמה גוף דבקות יחייב המקום, also II, 23, 33.

<sup>78</sup> See *Hegyon Hanefesh*, p. 3: כי המקום הוא דבר חופה את צלם. הגוף מכל סביבותיה מבחיין.

<sup>79</sup> *Microcosm*, p. 15: שאמתת המקום וענינו שהוא סמוך לפי שאין מקום מבלי מתקומם אין מתקומם בלי מקום.

<sup>80</sup> *Ibid.*, p. 11: ועל כן אין צריך למקום שכל חלק ממנו מקום לחברו. Cf. *Phys.*, IV, 6.

the surfaces of which compass the object that is in it'.<sup>81</sup> Aaron of Nicomedia, the Karaite, writes: 'The primary meaning of space is that which matter occupies, the dimensions of the spatial body being called space. It also denotes unoccupied dimensions or the whole space. And thinkers are at issue in this matter. Some apply the term space to that which is in contact with the surface of the body and surrounds it on all sides, others apply it to the void that embraces the universe; and the first opinion is the correct one.'<sup>82</sup> Finally, Gersonides takes the same standpoint when he argues that 'above and below relations are not due to any mathematical dimensions, but to the things that bear these relations. Thus light objects move upwards, heavy ones downwards; and when there was nothing light or heavy these above and below relations did not exist'.<sup>83</sup>

Thus we have seen how the Aristotelian conception of space acquired the certainty of a philosophical tradition. Jewish philosophers used it as a self-evident truism, as a logical foundation for the doctrine of *creatio ex nihilo* and other important theological doctrines, and it occurred to no one to question the validity of this foundation. Then Hasdai Crescas appeared, free from the hypnotism of the Greek master, and with a boldness that we must admire, considering the circumstances, commenced to challenge Aristotelian doctrines, including the one concerning space, and his challenge resounds in the *Dogmas* of his disciple Joseph Albo, and even in the works of Don Isaac Abrabanel by no means an independent thinker. Perhaps it was

<sup>81</sup> *Emunah Ramah*, p. 16: שכל מה שהוא במקום שטחי מקומו כופים עליו. Perhaps it should read חופים. Comp. the quotation from *Hegyon Hanefesh* in note 78.

<sup>82</sup> *Eṣ Hayyim*, ch. 20.

<sup>83</sup> *Millamot*, p. 371.

this challenge of Aristotelianism that marked the beginning of the end of the mediaeval period in Jewish philosophy.<sup>84</sup>

Crescas finds four difficulties in the Aristotelian notion of space, which he formulates very laconically, as 'the encompassing, equal, and separate surface'.<sup>85</sup> These 'difficulties' are not very difficult. First of all, he argues, the all-encompassing sphere, having no container is, according to Aristotle, in no space; but all things have their existence in space. Consequently, Aristotle is wrong. Secondly, Aristotle taught that every element has a certain affinity towards a particular place at which it is at rest and to which it is in motion. Thus air is naturally at rest in the concavity of the celestial layer of fire; everywhere else it can be at rest only by means of some external force. Now if this be true, it would follow that either the inner parts of the air will never be in their natural place, not being in contact with the concave surface of fire to which they strive as parts of the air element, or else their natural place is different from that of the whole—either of which alternative

<sup>84</sup> The reader should not assume, however, that Aristotelian influences disappear altogether from Jewish thought. Even a Kabbalist like Moses Botarel speaks of Aristotle in laudatory terms and accords him a seat in Paradise. See his commentary on the *Book of Creation*, p. 26, quoted in Steinschneider's *Hebraische Uebersetzungen*, p. 269. But the name of the 'Philosopher' no longer enjoyed universal and unquestionable authority. Thus Isaac Abrabanel, though often accepting Aristotelian notions, dares to confer upon him the epithet 'Ancient Serpent'; see his *מפעלות אלהים*, II, 3.

<sup>85</sup> See *Or Adonai*, ed. Vienna, 1860, p. 6, where the definition of space is formulated: *היות המקום השטח המקיף השווה הנברל*. Comp. Narboni on *Guide*, I, 73, prop. 2, where he speaks of *התכלית המקיף השווה הנברל*. On p. 15 Crescas advances four arguments against this Aristotelian definition. Compare also *Minḥat Kenaot*, by R. Jehiel of Pisa, p. 26: (i.e. of space) *שגדרו הוא תכלית הגשם המקיף במתקומם הנוגע בו*.



is absurd. Thirdly, how do the celestial bodies move in a circle, what place is the goal of *their* striving? Fourthly, Aristotle held that a rotating ball has its place, though accidental, in the axis which does not move; now if the axis is meant to be a material part of the ball, it is evident that motion in this case would be impossible without a disintegration of its parts, and if it is meant to be a mere geometrical line that can be drawn through the centre, it cannot be the place of the object.

These arguments are by no means convincing. Besides, they are not altogether relevant. They do not exactly 'hit the mark'. Crescas is more aggressive and much more convincing in the concrete problem of the void, which outgrows from this whole discussion, and which I reserved for later treatment. I shall therefore let these arguments pass without criticism. It should, however, be remarked that Albo also advances four arguments against the Aristotelian notion, the first two of which are identical with the first two arguments of Crescas.<sup>86</sup> Albo's other two arguments are as follows: According to Aristotle, the place of a part would be greater than the place of the whole, for a spherical body in which a deep break has been made will require a greater surface to contain it inside and outside than when it was whole. Thus let figure 1 represent a ball, and let figure 2 represent the same ball but in which a deep wedge-like hole has been hollowed out, and let the thread in both cases represent the Aristotelian 'container' or place. It is evident that figure 2 is only a part of figure 1, and yet it takes a greater thread to embrace the second ball than the first, because geometrically  $AOB$  is greater than  $AB$ . Consequently a part would occupy

<sup>86</sup> See *Dogmas*, II, 17. See also ספר הגררים, s. v.

a greater place than the whole, which is absurd. The second argument is a similar one. Take a body which occupies a certain amount of Aristotelian space—or let us call it for brevity's sake, place—and divide it; since each segregated part now requires a containing surface for itself, the total amount of place occupied by that body will now be greater. The further you divide, the greater the place that it will occupy, which contradicts the Euclidean law

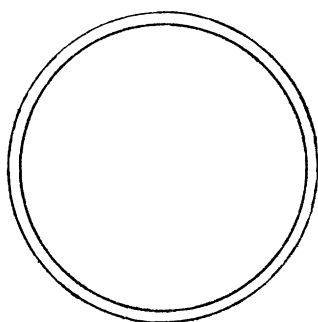


Fig. 1.

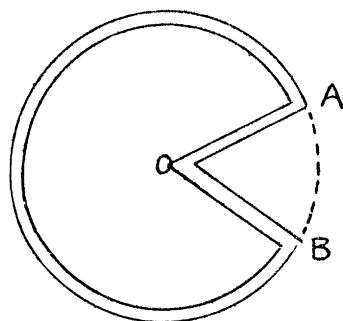


Fig. 2.

that equal bodies occupy equal spaces. These two arguments also are easily met by the idea that the Euclidean law of space cannot be applied to place.

To come back to Crescas, what was his own view of space? According to his conception, it is a great *continuum*, an infinite and immovable void, ready to receive material objects. And in receiving matter, it is not displaced, for it is immovable, but on the contrary it embodies itself in it and becomes concrete extensity, or, as Aristotle called it, the interval between the extremities of an object.<sup>87</sup>

<sup>87</sup> See *Or Adonai*, p. 15 b: שהמקום האמיתי לדבר הוא רוחק אשר בין תכליות המקום והשקרים אשר חייב אריסטו לזה הדעת אין ענין להם. See also 17 b. According to Simplicius, Plato defined space as

Aristotle rejected that view for the reason that all bodies move in space, and if the interval of a body were space in itself, we would have space moving in space. To this Crescas answers, there are no various spaces. *It is one infinite and immovable.* When matter is immersed in space it is like a net in a stagnant pool, which when moving does not disturb the silent waters. In other words, extensity and void are not two kinds of space, but really one; only the former has had an admixture of matter and has therefore visualized itself, while the latter is pure and hence invisible. Extended matter is like a streak of sunlight that has become visible by absorbing particles of dust. Thus we have no phenomenon of space moving in space. Empirical space and absolute space are one—this is the great idea of Hasdai Crescas.

Crescas found a faithful follower in Joseph Albo, who incorporated this conception of space in his *Dogmas*, but Albo seems to have been his first and last follower. Conditions in Spain, for some four centuries an asylum of Jewish culture, were no longer favourable for the development of free thought. The end of the fifteenth century found Spanish Jewry subjected to persecution and dire oppression, which strangled the zeal for genuine speculation in the Jewish breast and brought the progress of Jewish philosophy to such an abrupt end. It is, however, to the credit of the Jew's yearning for knowledge that even in those dreadful times a man like Don Isaac Abrabanel, one of the foremost statesmen of Spain, but later an outcast of the land which he faithfully served, found moments of leisure in the intermissions of his aimless wandering to

τὸ διάστημα τὸ μεταξύ τῶν ἐσχάτων τοῦ περιέχοντος (Simpl., *Phys.*, IV, p. 571).  
If Simplicius is correct, Crescas takes the Platonic standpoint.

compose philosophical treatises which, though wanting in originality, display a vast amount of erudition and acquaintance with philosophical systems. In the question under discussion he does not side with Crescas, but adopts the Aristotelian conception of space.<sup>88</sup>

II. The preceding discussion as to whether we are to understand by space a material receptacle or an unlimited *continuum*, is altogether useless, if not supplemented with a discussion of a problem which is implied therein, namely, the existence of a void. The Aristotelian conception involves a cosmology which admits of no void. The universe is composed of spheres one within the other, all compact, with no space between. The innermost sphere, sphere *A*, has its place in the concave form of sphere *B*, and sphere *B* in sphere *C*, and so forth. The uppermost all-containing sphere is in no place: it is the limit of the universe. Thus there is place; but no pure space, no void, whether between things or outside of them. On the other hand, if we mean by space an unlimited *continuum* embodied here and there in a concrete material object, a canvas as it were in which some fine tapestry is woven, we naturally postulate the existence of an unembodied space or a void. Thus so long as the Jewish thinkers unquestioningly accepted the Aristotelian notion of space, they discarded the possibility of a void; it was Crescas who first endeavoured to prove that the void is a real fact.

It is noteworthy that the existence of a void was one of the great issues between mediaeval Aristotelianism and Arabian scholasticism or the Kalam; the former, as we have seen, vigorously renouncing it, and the latter vigorously

<sup>88</sup> אשר הוא שטה הדבר המקיף שוה נברל: IV, 3, מפעלות אלהים  
למקומם כפי מה שנדרו אריסטו.

maintaining it. The Mutakallimun maintained the void, because it is an indispensable element in any system which resolves matter into segregated particles of minute magnitude generating all phenomena by their motion.<sup>89</sup> Jewish thinkers, we have found, were averse to atomism; so that the postulation of a void was no requisite of their system. At all events, Jewish philosophy before Crescas was unanimously against the existence of pure space.<sup>90</sup> Let us see some of its chief reasons.

Joseph ibn Zaddik offers a proof from nature. Take a pitcher and plunge it into water with its mouth upside down. No water will come in the pitcher. Remove the air, and the water will instantly rush into it, so as not to leave a vacuum. Or take a jar with a perforated bottom, fill it with water; of course the water will issue through the bottom, and air will enter through the top, and immediately fill the gap. Now fill the jar with water again, and close it so tightly as to leave no access to the air; no drop of water will leak through the pores of the bottom. This clearly shows that there is no vacuum in nature.<sup>91</sup> The argument, by the way, is Aristotelian, and is also cited by Narboni.<sup>92</sup>

How then is motion possible if there is no empty space? In a compact world of matter, where even elbow-room is denied us, how can we move? Ibn Zaddik adopts the Aristotelian answer. The air is very elastic, being

<sup>89</sup> See *Guide*, I, 73, prop. 2.

<sup>90</sup> Abraham Ibn Ezra is perhaps an exception to this statement. He nowhere posits the void, but one might infer it from the atomistic ideas that he expresses in the fragments called *ערוגת החכמה ופרדס המזמה*. See above, note 55.

<sup>91</sup> *Microcosm*, p. 16.

<sup>92</sup> See Narboni on *Guide*, I, 73, prop. 3.

easily condensed and rarefied. And when we press forward, we set up a system of condensation before us, and a system of rarefaction behind us. Even the removal of a drop of water thus affects the whole universe; but no vacuum is anywhere formed.<sup>93</sup> The reader will realize that, as Narboni rightly remarked,<sup>94</sup> the atomists could not have taken the same view in explaining atomic motion by condensation and rarefaction without being compelled to assume the existence of a void, because the atom is conceived to be an indivisible, non-magnitudinal and ultimate reality, and hence can neither swell nor shrink.

A similar argument for the non-existence of the vacuum is adduced by Maimonides from the science of hydraulics.<sup>95</sup> Water is being carried from a lower to a higher level by means of a pump out of which the air has been exhausted, the underlying principle being that 'nature abhors a vacuum', that it tends to fill an empty space as soon as it is formed.

An altogether original argument was suggested by the Kabbalist, Isaac Ibn Latif.<sup>96</sup> A visual sensation of light implies a certain gas medium through which radiant energy is being propagated in waves, finally impinging the retina of our eye, thus producing a sensation. Ibn Latif was of course ignorant of the modern undulatory theory of light; instead, he believed that an object of light emits certain material corpuscles—similar to the now repudiated Newtonian conception. But at all events a certain medium is required through which the radiant energy or the radiant corpuscles are transferred. Hence our vision of the luminary bodies proves the total absence of intervening

<sup>93</sup> *Microcosm*, p. 16.

<sup>95</sup> *Ibid.*, prop. 3.

<sup>94</sup> *I. c.*, I, 73, prop. 2.

<sup>96</sup> See רב פעלים, section 60.

vacuum. It is curious, however, that in the end he remarks as follows: '... and the very same demonstration for the non-existence of the void, is a demonstration for its existence; and understand this, for it is sealed.' How this argument also proves the reality of a void is not easy to guess, unless he meant that the radiant waves in order to move must have free space—a contention which, as we have seen, has already been refuted by earlier thinkers. But the argument in itself is noteworthy.

The reasons so far advanced are drawn from the realm of nature, and all they may prove is that there are no empty interstices between the material objects, that the equilibrium of the world demands a filling up of all gaps, leaving nothing empty. They demonstrate the familiar maxim: 'Nature abhors a vacuum'. Of course, as Solomon Maimon, the Kantian interpreter of Maimonism, correctly suggested, nature does not exactly *abhor* a vacuum, it is *forced* to fill it; that is to say, a vacuum is a *natural* existence, only it is obviated by external forces. When the air is exhausted from the tube, the water is forced into it by the atmospheric pressure; so that when the tube is too high for the atmospheric pressure to raise the water, a void will *naturally* form in the tube. This physical phenomenon was entirely overlooked by the men I have mentioned. The mediaeval term *horror vacui* is really misleading. At all events, those arguments tend to refute the existence of void within the material realm, or, following the analogy of our previous terminology, *empirical void*, which does not mean an experience of a void, but a void of experience, or a blank in the midst of objects that appeal to our sensation. Now what of *absolute void*, what of pure infinite dimensionality in which the universe is supposed to exist, is it

real or fictitious? Is there any space beyond the confines of the world? Or let us imagine matter annihilated or non-existent, would there be space after all?

Gersonides answers these questions negatively. Tridimensionality is a quality of matter; take away matter and you have no space. It is absurd to say that before the creation of the tangible world there was pure space; for if so, why did God create the world in this part of the infinite void and not in another? The void is alike in all its parts, no one of which owns a greater possibility of being informed and embodied than another. If then you assume a void, you have to assume logically a coextensive infinite matter, which is likewise absurd. Hence pre-existent space is an impossibility.<sup>97</sup> The argument is based on the theory of creationism, a theory no longer tenable in philosophical circles; but the whole question about the *pre-existence* of space is a scholastic one. Gersonides, however, goes a step further, and endeavours to show that any form of empty space is inconceivable. There is a patent contradiction involved in the term 'empty space'. Space, we know, is measurable and infinitely divisible. But empty space means that there is nothing existent, in short, nothingness, and how can we conceive of nothingness as measurable or divisible, or of one nothingness as greater than another? Consequently empty space is an *absurdum*. The argument hides a certain fallacy, but let us go on and see the concrete example which he offers in order to demonstrate the absurdity of the void. Imagine two bodies separated by empty space, one *ABCD* and the other *EFGH*, placed in two positions, the lines *AB* and *EF* in one position being parallel lines, and oblique in the other.

<sup>97</sup> See *Milhamot*, p. 365.



Now in Figure 1 we say that the intervening distance or void represented by  $AE$  equals  $BF$ ; while in Figure 2 we say  $AE$  is greater than  $BF$ . But both  $AE$  and  $BF$  do not represent any material existence, consequently they are zero, and how can zero be a basis of comparison, and above all how can one zero be greater than another? Hence the void is an absurdity.—Q.E.D.<sup>98</sup> But it is evident that Gersonides plays hide-and-seek with the notion of pure space. This term stands for mere dimensionality devoid

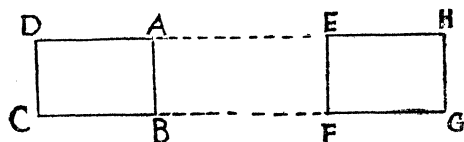


Fig. 1.

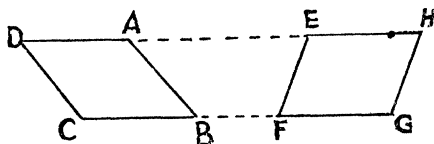


Fig. 2.

of any material thing. Now if one were to count things, he would of course have to leave out the void, and consider it mathematically zero. But here it is not the counting of the two bodies that is involved, but the *extension* of the intervening void; and from the point of view of extension, the void is a definite quantity unless it has been previously demonstrated that the void is an impossibility—something that is here to be proved. Gersonides, therefore, in assuming that the lines of extension  $AE$  and  $BF$  are zero, is clearly arguing in a circle.

Gersonides, however, concludes that the void is an

<sup>98</sup> *Ibid.*, pp. 378 and 379.

illusion. It is strange that such an acute thinker should fall into such an open fallacy ; perhaps it was the Aristotelian system to which he mainly clung that required of him such a conclusion, and the need of a conclusion blinded him to the validity of the reasoning. Reason is very often sacrificed in order to suit a system. At any rate, Gersonides firmly held that the universe is finite ; that there is no space beyond the world. But here a logical puzzle presented itself to his mind. ‘ There is no space beyond the world ’, but does not the very word ‘ beyond ’ suggest space ? Does it not convey the notion of outstretched plains, even while this is meant to be denied. Let us expand that brief statement ; do we not mean that there is no space in the space beyond the world ? Is not therefore the whole idea about the finitude of space meaningless and erroneous ? Gersonides, however, does not despair. The puzzle is not real, but linguistic. Human language fits our daily needs, but is not rich enough to express many a fine shading in reality. It is incapable to express the absolute absence of space in terms of before and after, just as it is incapable to express the absolute non-existence of time in the relations of before and after. When we say, what was *before* the beginning of time ? we experience the same difficulty. It is not however real, but simply verbal, due to the inadequacy of language.<sup>99</sup> This is Gersonides’s solution of the puzzle. Some five centuries after, Kant also grappled with this puzzle, but his solution was different. We can conceive no end to space, no limits beyond which there is no space. Hence space must be a necessity of thought, a form of intention. Which solution is saner this is not the place to discuss.

<sup>99</sup> *Ibid.*, p. 384.

So much for the negative side of this void-discussion. This side, it should be noted, does not make out a very impressive case. Its reasoning is sometimes hackneyed, and sometimes faulty. Judah Halevi counted the void as one of the things that common sense seems to accept, and syllogistic reasoning rejects;<sup>100</sup> but he did not show us what this 'syllogistic reasoning' is. Yet although the proposition which this side attempted to put forth had no great intrinsic force, it had that force which is in every view that coincides with tradition. It traced back its lineage to Aristotle. *Ipsa dixit*. That is why this negative view was popular in Jewish philosophy for so long a time. At last the affirmative side appears on the scene, represented by one man only, radical, bold, and daring—Hasdai Crescas. Let us hear what he has to say.

Crescas does not enter into a detailed discussion with the followers of Aristotle, he attacks straightway Aristotle himself. Incidentally he points out the absurdity of Gersonides's difficulty with empty space as a magnitude. If you remove the air from a jar, you do not remove extension along with it. And the empty extension in the jar is of course measurable and divisible.<sup>101</sup> He also shows in passing that finite space is inconceivable, because what is there beyond?<sup>102</sup> Crescas evidently rejects Gersonides's explanation by an appeal to linguistic poverty. He also clears another difficulty that Gersonides had in connexion with the void, namely, the void is the same in all its parts, why then did God create the finite world in this part of the infinite void rather than in another? Crescas answers that

<sup>100</sup> *Cosari*, III, 49: כאשר תרהיק המחשבה והסברה העדר הרקות והקשות השכליות מחיבות זה.

<sup>101</sup> See *Or Adonai*, p. 15 a.

<sup>102</sup> *Ibid.*

just because the void is the same in all its parts it is absurd to ask why God should have created the world in another part rather than in this.<sup>103</sup> His main charge, however, Crescas concentrates on Aristotle himself. He examines his arguments singly and discloses their weakness. We will follow the order of his treatment.

1. If void existed, says Aristotle, there would be no motion. For motion is either natural or forced; natural motion being that of a body moving *to* the place to which it has affinity, as an apple moving downwards, and forced motion being that of a body moving *away from* the place of its affinity, as when an apple moves upwards. But a void is *mitdammeh hahalakim*, the same in all its parts, no one of which can enjoy the special affinity of an object. Hence natural motion in a void is absurd. And since it is implied in forced motion the latter is also absurd. Moreover, imagine an arrow hurled from a bow-string; now ordinarily the arrow moves on by virtue of the fact that the air which has also received a violent attack from the bow-string becomes a propelling power for the arrow. Now in a void where such a propelling power is lacking, we should expect that no matter how much the string is strained, the arrow should powerlessly fall down, as soon as it leaves the string. Thus motion in any of its forms is impossible in a void, and hence the void cannot be conceived to exist. Thus, instead of maintaining that motion is impossible *without* empty space, the true idea is that motion is impossible *with* empty space.

To this Crescas replies: The fault of this argument is chiefly in failing to realize that the void is not considered by its adherents to be the *cause* of motion, but only the

<sup>103</sup> *Ibid.*, p. 70 a.

*medium.* The argument seeks to disprove the idea that the void is cause—an idea maintained by no one. Aristotle argues that the void cannot bear any special attraction to any body, and since that attraction is the basis of motion, the latter is inconceivable in a vacuum. But no one claimed that it does have any peculiar attraction. Gersonides has already remarked that the notions of 'upward' and 'downward' are not due to mere mathematical dimensions, but to the objects that may be up or down. The fire does not seek any mathematical dimensions above it, but the concave lunar surface. Thus it is not the void that exercises any attraction or repulsion, but the bodies in it. The earth attracts the apple, and there may be an intervening void, yet that does not hinder motion, but on the contrary helps it, serving as a free medium. Indeed, the whole Aristotelian position is questionable. *A medium is no requisite for motion.* It hinders it; the rarer the medium, the freer the movement. Light objects move upwards, and heavy objects move downwards, or rather—and here a very important physical theory occurs to his mind—*all bodies move downwards*, only, the lighter bodies are pressed upwards by heavier downward moving bodies. And all this goes on without necessitating a material medium which is really an obstacle and a hindrance for a moving body. It is the void which is the true medium for the free exercise of motion.<sup>104</sup>

2. The second and third arguments of Aristotle are treated by Crescas simultaneously. Motion, speaking mathematically, is a function of two variables: the medium and the motive force. Let us see the medium-variable first. The velocity of a body is proportioned to the

<sup>104</sup> *Ibid.*, p. 14 a ff.

medium: the rarer the medium, the quicker the motion. If we could imagine a medium of an infinitely rare density, then, all other things being equal, the body would move in an infinitesimal time. But the void has altogether no density, hence a body will move therein in no time at all. But this is absurd, for the distance in which the body moves is divisible, it is a succession of points; and the moving body 'must take its time', it cannot come to the second point before it passes the first, and when it is on the second point, it is not yet on the third. Hence even this 'champion racer' must take cognizance in its movement of the relations of before and after, and consequently must take up some time after all. Therefore the void is an impossibility.

The impossibility of an absolutely timeless movement is further corroborated when we come to examine the second variable of motion, i.e. the motive force, which forms Aristotle's third argument. The velocity of a body is, all other things being equal, directly proportional to the propelling power: the stronger that power, the swifter the motion. This law holds true in the hurling of a weight upward in the air, as well as downwards in the water, and we should expect it to hold good also in the case of a vacuum. But in accordance with the law of the first variable, a body moves through a void under a given force in no time. Now double that force, and the velocity will have to be doubled too. But what can be quicker than timeless motion? Hence, Aristotle concludes, the void is an impossibility and an absurdity.<sup>105</sup>

To these two arguments Crescas replies: A body that is impelled to move by a certain force acquires a certain

<sup>105</sup> p. 5 a.

'fundamental velocity'; that is to say, a fundamental capacity to move a certain distance within a certain time unimpeded by any medium like water or gas. When that body happens to meet a medium, its velocity is slackened of course. The denser the medium, the slower the movement. Remove the medium, and the body will resume its initial 'fundamental velocity'. Thus the law that the velocity of a body is inversely proportional to the density of the medium is not a true statement of fact. Represent it mathematically, and you have

$$\frac{V}{V'} = \frac{D'}{D}; \quad V' = \frac{DV}{D'}.$$

But the density of the void ( $D'$ ) equals zero, hence

$$V' = \frac{DV}{0} = \infty.$$

Thus the velocity of a body moving in a vacuum is infinite, which is absurd, as Aristotle himself has shown. But this whole mathematical formula is untenable. The true law is *that the slackening of the 'fundamental velocity' of a given body is directly proportional to the density of the medium.* Thus representing the slackened progress by  $S$ , we have

$$\frac{S}{S'} = \frac{D}{D'}; \quad S' = \frac{SD'}{D}; \quad \text{but } D' = 0, \quad \therefore S' = 0.$$

In other words, a body moving in a vacuum, not being impeded by any medium, will move according to its 'fundamental velocity'. It is just as unwise to argue that inasmuch as a body moves swifter in a light medium than in a dense, it will move in a void in no time at all, as it is to maintain that because a man that is less tired will move faster than a man that is more tired, a man that is not

tired at all will move altogether in no time. Both statements leave out of consideration the principle of the fundamental natural velocity.<sup>106</sup>

3. The fourth argument of Aristotle is as follows: The void is conceived as mere tridimensionality, ready to receive material objects, the dimensions of the thing uniting with the dimensions of the void, and forming one. But how is it possible? How can two ells form one ell? And if it is possible in the case of matter and void, why should it be impossible in the case of matter and matter? We will thus have to suspend the law of impenetrability, for the reason why two bodies cannot occupy the same space at the same time, is not because they are black or warm or in any other way qualified, but because they have dimensions. And yet some assume that a body can penetrate a void which is spatiality itself. If then this were true, there should be an equal possibility of compressing two or more material bodies into one, and we should thus be enabled to compress the whole universe into a tiny insignificant speck. Thus the assumption of the void leads us into monstrous absurdities.<sup>107</sup>

To this Crescas replied: Two things cannot occupy the same space in the same time, not because each one of them has its own dimensions, but because each one has *dimensional matter*. In other words, in order that a body should be impenetrable it must have two things combined: spatiality and corporeality. And just as unextended matter, if such a thing were conceivable, would not be impenetrable, so spatiality devoid of matter could not resist the intrusion of a material body. That is why an ell of matter and an ell of a void can so combine as to form one. Crescas

<sup>106</sup> *Ibid.*, p. 14 b.

<sup>107</sup> *Ibid.*, p. 5 a.



herewith also replies to Zeno's argument that if space were real, it would be in space; for all things real are in space, and so on *ad infinitum*. It is only material spatiality that occupies and monopolizes a certain space so as not to admit any other body to immigrate into its domain; pure spatiality has no policy to refuse immigration, on the contrary, it bids welcome to any object that seeks to settle within its borders. Hence the void does not strictly speaking 'occupy' space, and is always ready to be intruded as long as it has not been invested with corporeality.<sup>108</sup>

Such were the refutations that Crescas hurled against the Aristotelian position. The reader will undoubtedly be impressed by the soundness of the argument, as well as by his turning his back on Aristotelian physical notions, and catching glimpses of the modern science of physics. We may nowadays repudiate the possibility of an absolute void and claim that there is an all-filling and all-penetrating ether, but the existence of ether is after all only a hypothesis. Empirically the void is by no means denied. It should also be noted that while the Mutakallimun postulated the existence of a void merely to suit their atomic system, Crescas who did not adopt the atomic standpoint takes a different course. He first disproves the seemingly convincing Aristotelian arguments, and having removed by sound reasoning the traditional prejudice, he shows that the void is attested by our daily experience. That is why *his* theory of the void, and not that of the Arabian theologians, forms a real contribution to the history of philosophy. Sometimes negative, destructive reasoning is more important than positive reasoning. To destroy the enemy is to win the battle. We should also mention in this connexion

<sup>108</sup> *Ibid.*, p. 14 b.

Crescas's discarding the Aristotelian notion that different elements strive for different places, that fire and air naturally tend upwards. Crescas reduced this variety of forces to one force of gravitation. All bodies are attracted downwards, only air being light is *pressed* upward by some heavier matter. 'Light' and 'heavy' are not different in quality, as Aristotle meant, but different in degree, the degree of attraction that the earth exercises from them.<sup>109</sup> This unification and centralization of forces rids us altogether of the Aristotelian illusion of different 'affinities' and 'natural places', notions which play a considerable part in the problem of place versus space. Thus these two theories of Crescas, the defence of the void and the unification of forces, are landmarks in the progress of Jewish thought.

Coming to Isaac Abrabanel, we are not a little disappointed. Instead of continuing with the development of the pure space problem along the lines of Crescas, he goes back to Aristotelianism. This does not mean that he did not read the *Light of God*. He not only read it, but was even so much infatuated with some parts of it that he incorporated them into his works and forgot to label their real authorship. Compare for example *Light of God*, p. 70, and Abrabanel's *Works of God*, IV, 3. But the plagiarist is not always the disciple. He thus returns to the old-time definition of space as 'the surrounding equal and separate surface'.<sup>110</sup> He adopts the view of Averroes that space came into being with the creation of the material world,<sup>111</sup> that is to say, that there was no pre-existent empty space. He thus answers the question why God created matter in

<sup>109</sup> *Ibid.*, p. 9 a.

<sup>110</sup> מַּפְעֵלוֹת אֱלֹהִים, IV, 3. See above, note 87.

<sup>111</sup> *Ibid.*, II, 1.

this part of the void rather than another,—there was no pre-existent void altogether; and he cites a similar view of St. Thomas, ‘sage of the sages of the Gentiles’.<sup>112</sup> The reader will readily see the eclectic nature of his standpoint. Yet there is one passage in his work which deserves being quoted at length, serving as a fit conclusion to this chapter. It deals with the problem why the mind cannot think of finite space, of limits to extensity, why even in our speaking of an end to the dimensionality of the universe, we seem to imply a ‘beyond’. We have seen that Gersonides held this difficulty to be purely linguistic. Crescas on the other hand cited this as a proof for the infinity of space, just as Kant inferred from it that space is a necessity of thought. Abrabanel takes a view similar to that of Gersonides, but there is a strong note of modernity in his explanation. ‘It is impossible’, he says, ‘to conceive the beginning of time without a pre-existent time. Also the limitation of the material world is inconceivable without a beyond-existing place. But this difficulty of conceiving temporal or spatial finitude is purely mental, and does not disprove real finitude. It is in like manner hard to conceive of a thing coming into actual existence without thinking of a preceding potentiality; yet of course it does not mean that there was *actually* a pre-existent potentiality, but only an intellectual idea of such a potentiality. All this is a result of the fact that the phenomena perceived by our senses always have things beyond them in space and things before them in time, and that before these phenomena are actual they are potential; so that these relations of “before” and “beyond”, always present in our perception of things, have impressed themselves on our minds so deeply as to

<sup>112</sup> *Ibid.*, VI, 3.

be unable to conceive of things without those relations. But after a certain amount of reflexion the mind can correct this error arising from perception, and can rid itself of its acquired *habit*, and come to realize that reality is not absolutely conditioned by those relations.’<sup>113</sup>

This is how Abrabanel seeks to explain why space is seemingly a necessity of thought, so that the mind is unable to conceive bounds to the space of the universe. It arises from a ‘habit’ which the human mind contracted from its perceptual experience to seek a beyond for all things. Yet it takes only a certain amount of mental energy by way of reflexion to transcend this genetically acquired habit, and conceive of an absolute finitude of space. It is not a *necessity* of thought, but a *habit* of thought; and it is the business of a philosophical mind to shake it off.

But this leads us directly to our next problem concerning the infinity of space; and as the contents of this chapter do not require any recapitulation, we will pass on.

*(To be continued.)*

<sup>113</sup> *Ibid.*, IV, 3.